April 14, 1859.

Sir BENJAMIN C. BRODIE, Bart., President, in the Chair.

The following communications were read :—

I. "On the means by which the Actiniæ kill their Prey." By Augustus Waller, M.D., F.R.S., Professor of Physiology in Queen's College, Birmingham. In a Letter to Dr. Sharpey, Sec. R.S. Received March 11, 1859.

In the 'Proceedings of the Royal Society' for the 18th November, p. 478, I perceive that Dr. M'Donnell's fresh observations on the Actiniæ have led him to abandon the opinion which he had been disposed to entertain as to their possessing electrical powers similar to those of the torpedo. During a stay at the sea-side in the winter of 1857–58, I put in hand some experiments for the purpose of testing the supposed electrical powers of these animals, which, as I some months since mentioned to you, led me to negative conclusions relative to their siderant power. Dr. M'Donnell's recent observations having removed any occasion of controversy, I will briefly mention the results that I obtained.

The most interesting fact observed by Dr. M'Donnell is the contraction of the galvanoscopic frog when the Actinia seized upon the sciatic nerve. On repeating this experiment, I was particularly struck by the uncertainty and irregularity with which these contractions were obtained, being sometimes very strong, while at others they were imperceptible, notwithstanding all the precautions that I could take as to the frogs being fresh caught and irritable, besides attending to the rules laid down by Matteucci.

On the other hand, when, in lieu of a galvanoscopic frog, I presented a Nereis to the Actinia, the result was invariably the death of the animal. The effect of the Actinia's grasp upon the Annulata is mortal, although the retention may not have been allowed to exceed a few moments. The first symptom which I observed was that of writhing, as if the creature were in great pain, and which in the most marked cases was succeeded by paralysis with flaccidity of the muscles, like a frog acted upon by woorara. The action of the

dorsal vessel, which still persisted long after the loss of voluntary power, was very irregular and segmental, the vessel being bloodless and inert at intervals.

It appeared indifferent whether the cephalic or the caudal extremity of the Nereis was attacked by the Actinia, similar symptoms being produced in both cases.

In order to ascertain how far these symptoms were produced by electricity, I subjected the Nereis enclosed in a glass tube to some violent shocks by means of an electro-magnetic machine, which were merely productive of a slight temporary inconvenience to the animal, unattended by any after evil effects. It is most remarkable what powerful electric action these creatures are susceptible of enduring without injury; the strongest action of an electro-magnetic machine on Du Bois Reymond's principle, which affected myself violently up to the elbows, appeared to be easily endured by them.

The above experiment is quite sufficient to show how impossible it is to attribute the fatal influence of the Actiniæ to simple electrical action.

In order to elucidate the real power of the Actiniæ—after having in vain exposed the finger on which the cuticle had been softened by soaking in water—considering that the tongue was better adapted for the purpose in view, by reason of the thinness of its cuticle, I presented its apex to the tentacles of an *Actinia mesembryanthemum*, of about the size of a half-crown piece. The result was such as to satisfy the most sceptical respecting the offensive weapons with which it is furnished. The animal seized the organ most vigorously, and was detached from it with some difficulty after the lapse of about a minute. Immediately a pungent acrid pain commenced, which continued to increase for some minutes until it became extremely distressing. The point attacked felt inflamed and much swollen, although to the eye no change in the part could be detected. These symptoms continued unabated for about an hour, and a slight temporary relief was only obtained by immersing the tongue in cold or warm water. After this period the symptoms gradually abated, and about four hours later, they had entirely disappeared. A day or two after, a very minute ulceration was perceived over the apex of the tongue, which disappeared after being touched with nitrate of silver.

I have subsequently frequently repeated this experiment on myself

and others, using greater precaution, and have invariably obtained similar symptoms of urtication. In only one instance has a minute ulceration been the consequence.

It is very evident therefore that the Actiniæ act by means of an acrid irritant poison, similar in some respects to that of the wasp, or of snakes, which quickly spreads through the system of the Annelida, producing the above-mentioned results.

It remained to determine whether the poisoned weapons existing in such numbers over the surface of the Actiniæ were left in the part attacked. For this purpose I stretched a thin India-rubber membrane over a glass tube. After its seizure by the Actinia, I found that under the microscope it was studded in many points with the poison darts inserted slightly in the membrane, without their having penetrated through. In this respect my observations differ from those of Mr. Gosse, who considers that a fragment of cuticle from the hand was perforated by these darts.

I remain, &c.,

AUGUSTUS WALLER.

II. "On the Double Tangent of a Plane Curve." By ARTHUR CAYLEY, Esq., F.R.S. Received March 17, 1859.

(Abstract.)

The author notices that the problem of finding the number of double tangents was first solved by Plücker in 1834 from geometrical considerations, and he gives a sketch of the subsequent history of the problem. The complete analytical determination of the double tangents was only obtained very recently by Mr. Salmon, and is given in a note by him in the Philosophical Magazine, October 1858: it is there shown that the $(n-2)$ points in which the tangent at any point of a curve of the order n again meets the curve, are given as the points of intersection of the tangent with a certain curve of the order $(n-2)$; if this curve be touched by the tangent, then the point of contact will be also a point of contact of the tangent and the curve of the order n, or the tangent will be a double tangent. The present memoir relates chiefly to the establishment of an identical equation, which puts in evidence the property of the curve of the